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Huascarán is surely higher than Aconcagua, which the latest authorities give as 22,812 feet, and is thus the loftiest mountain known on this hemisphere. If future triangulations, or observations made on the summit of the south peak, which is probably a trifle higher, should prove, as I have hoped, the altitude of Huascarán to be 24,000 feet, I shall have had the honour of breaking the world's record for men as well as women.

THE PLATEAU OF THE SAN FRANCISCO PEAKS IN ITS EFFECT ON TREE-LIFE.

PART II—(CONCLUSION).*

BY

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III.

Looking south from Observatory Mesa over a wide stretch of the once primeval forest one's vision is barred some fifteen miles away by Mormon Mt., which, like a huge porpoise with snout pointing to the east, lies stretched along the horizon. The blue of distance invests it with a height it does not properly possess; for the barometer, as it proved later, accords it but 8,400 ft., or 1,400 ft. above the pine-clad plateau upon which it rests. Tree-covered to its top, the eye can distinguish vertical scars seaming its face, but no difference in the distant look of the trees themselves. On the north slope the snow holds longer than on the plain below and patches of it high up on the side send glints across the intervening air, well after the winter's sheet has elsewhere disappeared. Only upon the Peaks do such vernal lingerings find antiphonal response.

Alluring to the thought, it was to it that the second camping trip was made. The way thither lay through Clark Valley, so-called after John Clark, the first white man to settle hereabouts in 1876, when wild turkeys often loaded the trees and bear at times made him take to the trees himself. The road now is known as the Verde trail and is in places execrable beyond belief of a trail through an open forest until one had had experience of the mud here in spring, the ruts then made remaining stereotyped through the year. The traveller leaves this for one still worse a couple of miles from the mountain's base and shortly comes out upon Mormon Lake, a sheet of muddy water locally famous for its ducks in spring and autumn. Half-way down its western shore, a little valley marks the end of Mormon Mt. and a spring of water offers a good spot to camp at 7,150 ft. The names are relics of a not remote past. For this whole country was early colonized by Mormons, the chief of whom, one Elder Smith, was a fugitive ringleader of the Mountain Meadow Massacre and continued here his lawless career until he was shot some years ago by a victim of his cattle stealing at his ranch near Lee's Crossing.

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* Part 1 printed in BULLETIN, May, 1909.

A steep slope led from camp to the summit of the mountain, a nearly flat top a mile long, devoid, however, of any signs of a crater, but ridged in places like a wisdom-tooth. On its southeast side, up which the ascent was made, the first Fir, a Silver one, appeared at 7,750 ft. and the first Douglas Fir at 7,870 ft., both firs becoming more numerous and the pines less so as the height increased, though the latter contested still the southern half of the summit. At the summit a curious exception to the general choice of lightning showed in the person of a fine Silver Fir which had been wrecked by a bolt, though plenty of pine stood conveniently near. Quivering aspens here and there diversified the park-like summit in the glades, while, elsewhere, almost impenetrable thickets of gooseberry bushes with great red fruit occupied the bottoms. On the north face of the mountain, the gash of a landslide, one of the scars descried from the Observatory, offered an unobstructed view over the country below, and, the fulness of time having come for lunch, Doyle and the director sat down to drink in the scenery. Gazed from instead of gazed at, their standpoint gave a very altered look to the landscape, which now seemed utterly wild. Flagstaff had faded from sight, even the lumbermen's ravages no longer showed; only a tiny white speck flecked a distant mesa, which position assured them was the dome of the Observatory. In all this country dominated by the Peaks, it stood out sole token of man. That it alone of man's handiwork should thus show afar seemed curiously symbolic of its position toward the world at large.

After lunch the two further explored the top till they reached the end of the western side. On the southwest fell away a broad ravine filled with Silver and Douglas Firs. This the director descended to find the lower limit of both species in it at 7,800 ft. But upon the ridge-slope south of it he had to rise to 8,200 ft. before reaching them again. From comparison with the altitudes for the same trees on the southeast face, it is evident that the southwest one is the warmer.

The next day, the two explorers set out to investigate some hills to the southeast of the lake. The nearest of them, a sharply conical summit, had Silver and Douglas Firs almost at its foot on the north and northeast at 7,350 ft., which thence climbed to the top at 7,920 ft., occupying the rocky apex there, but not descending at all down the southwest slope. Nor was Anderson Mesa, just eastward, a nearly level plateau at 7,700 ft., occupied by anything but pine (*Pinus ponderosa*) and White Oak.

SILVER AND DOUGLAS FIRS.
Hill south of Mormon Mt., 7,500 ft.

The day was September 28, and on the way up the hill Doyle killed a tarantula at 7,600 ft. The date is significant, because, though this great spider inhabits the country the year round it is never seen at any other time. During the months of September and October of this year three more specimens were captured on the ground right round the Observatory, members of both sexes apparently. During the rest of the year, you shall search for them in vain; a deprivation tempered by the fact that they then do not find you.

That afternoon, two of us went up the ravine behind Mormon Mt. on the south to look for a mountain lion seen by some others of the expedition the day before. It seems that the lion almost licked their hands and then ambled away. The present searchers could not find the place, still less the lion, but discovered that Silver Fir descended the north side of the ravine to 7,400 ft., 800 ft. lower than on the mountain side opposite.

How the northeast face of the mountain itself was circumstanced was shown the next day. Here Silver Fir came down to 7,200 ft.

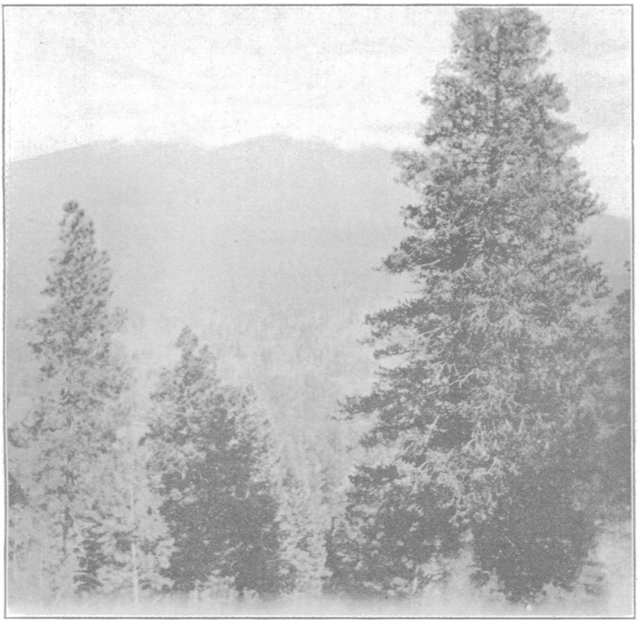
SILVER FIR. (ABIES CONCOLOR.)

N. E. slope of Mormon Mt., 7,200 ft., standing a lonely outpost amid the pines.

and Douglas Fir to 7,370 ft. The Silver Fir proved in all this country to have a slightly lower range than the Douglas Fir, from ten to a hundred and seventy feet according to locality. But, what was peculiar, these two trees monopolized the Canadian zone here. Not a specimen of Rocky Mountain pine occurred in all its islets; in marked contrast to the state of things in the arborial islands fifteen miles away to the north.

IV.

The next excursion was to Wing Mt., made directly from the Observatory; a crater, this, some five miles southwest of the Peaks. Wing Mt. is a nearly perfect cone, truncated in slant to the southwest where the original crater spilled its contents. On the north, its base lies at 7,600 ft. The explorers mounted by the northeast face through a grove of aspen to encounter the first Rocky Mountain Pine at 7,800 ft. on the slope and the first Douglas Fir at 8,020 ft. Both trees descended a hundred and fifty feet lower in the gullies.



WING MT.

Half-way up looking toward the Peaks.

Through their branches beautiful vistas showed of the flanks of the Peaks opposite, flecked with gorgeous golden gleams of the turning aspen scattered in patches upon them and the mountain's slope looked all the steeper for the framing it thus got; an effect the director first noticed on descending Fuji in Japan years ago when suddenly catching a glimpse of a lake below through cloud. The water seemed to lie tilted toward him at an angle of fully fifteen degrees. The summit of Wing Mt. is an almost circular rim hardly fifty feet across, and rising a hundred and fifty feet in its circuit from the southwest to the north, yet so evenly, a carriage might drive along it through the nearly treeless grass. The top at the north stands at 8,610 ft., while the survey cairn on the east is placed at 8,545 ft. Of the outer slopes the northern moiety is studded with fir, while the southern half is tenanted exclusively by yellow pine. On the inside, the slopes to the crater, perhaps a hundred feet below, are also entirely pine-clad except in the centre, which is only carpeted with grass.

Eastward of Wing Mt., across an arm of the Fort Valley, stands Crater Hill. Some miles away in an air-line the ramparts of the two former volcanoes confront one another, while their vents discharged in opposite directions. Between the two the country lies at the general level here of the plateau, the neck of land connecting them, in the first government map, being a government monopoly. From Crater Hill, eastward, stretches its great lava flow, now a mesa five miles long by a mile and a half broad, on the eastern tip of which stands the Observatory. The altitude of this lava flow is 7,650 ft. where it abuts upon Crater Hill and 7,250 ft. where it ends abruptly at the Observatory. It discloses its own thickness, 350 ft., in the height of the edge of the mesa above the town. Composed

DOUGLAS FIR.
Wing Mt., north slope, 8,000 ft.

of a mass of malapais stones which age has partly buried in loam, it is tenanted by an open forest of yellow pine, very sparsely undergrown of grass. It is worthy of note that only its edges support a varied flora, either of flowers, shrubs or trees, its flower fringe being coincident with the strip that gives foothold to the oak.

In consequence of the founding of the Observatory and of the building of a road up to it from the town, a cart-track now traverses the formerly trackless length of the mesa; over which a rough drive of five miles takes one to the crater's foot. In the present instance the ascent was made from the southern side. This slope is tenanted like the mesa by yellow pines alone until within a hundred feet or so below the rim where, strange to say, there is a solitary specimen of *Pinus flexilis* at 8,150 ft. and an equally solitary one of Piñon at 8,200 ft. The *Pinus flexilis* is a sorry-looking individual, regretful apparently of having strayed round the corner; for a quarter of a mile away are many of its kind on the northwest and north slopes. The tree there tops the crater wall in company with the Douglas Fir at 8,300 ft. The wall dips slightly at the north to rise at the northeast into a buttressing peak, 8,330 ft. high, from the top of which both Mr. Lampland and the director could see with the naked eye not only the little white flag on the cairn of Wing Mt., three miles and a half away in an air line, but the pole from which it fluttered, a light gray stick, three inches in diameter and six feet high. This last came out by flashes much after the manner of the canals of Mars, so that we have here a maximum criterion of their width. For three and a half miles of air in the middle of the sun-heated day is a much more unsteady thing to see through than a vertical column at night.

V.

Ascent of the San Francisco Peaks.

It was mid-October when it came the turn of the Peaks to be climbed. It was high time. Long before this the first snow had fallen on them, but it had now begun to be permanent and to descend lower with each new fall. The slopes themselves were ablaze in patches with the golden tints of the dying aspen, the calling of the autumn from afar. Through some of these the ascent would lie; for the attack was to be made from the southwest side and the descent effected on the north, in order thus to explore the warmest and the coldest slope exposures. The usual climb is made from the southern face up which there is trail.

The exploring party consisted of a guest—a young journalist—the director, his man-servant and Doyle. On the afternoon of October 15, the start was made from the Observatory, and camp was pitched that night near Le Roux springs at the head of Fort Valley at an elevation of 7,380 ft. Above it rose the spurs of the mountain mass. Round the camp-fire the plan of action for the morrow was discussed. It was the purpose of the director to ascend Agassiz Peak first, continue thence along the ridge to Humphrey and from there to descend as nearly northeast as might be, while Doyle was to take the camp outfit round the mountain and meet the descending party on the other side. A certain sheep-camp lay at about the spot where the mountaineers wished to come down, but it was far from certain where it was. As neither of the two parts of the expedition was properly acquainted with the position of the rendezvous, Doyle not having been there for many years and the others never, it was agreed that when Doyle reached this uncertain sheep-camp, if he ever did so, he should light a smudge for the others to steer by. To make this problematical meeting was imperative, as there were no houses upon that side of the Peaks. With

DOUGLAS FIR (BOLE).
San Francisco Peaks, 8,700 ft.

this pleasing doubt before them and clouds threatening the summits, the three pedestrians slept that night and set out the next morning.

The first hour saw them trudging up the outer spurs through the pine forest at a fairly steep incline for several hundred feet of ascent. At the top of the buttresses, the Peaks thus thrust out into the plain, they came upon the outposts of the Fir zone, a Douglas Fir or two and a Rocky Mountain pine. The height was 8,250 ft. Behind, in a little hollow, their deciduous accompaniment, the quivering aspen, shimmered in the faint breeze. Its leaves, now in their golden prime, made a glittering canopy overhead, yellow tingeing through orange to almost red at times, and a carpet no less brilliant below, as if Nature had run a carnival of riot the night before and strewn the ground with tree confetti. Pines still contested the soil up to the ledge overlooking the Waite Ranch (8,520 ft.) ; from the ledge, 8,670 ft., the fir zone definitely began.

Passing through some open glades to a spring and then up one of the ravines, the explorers came upon the first Silver Fir (?) at 9,350 ft. and the first Cork Fir at 9,480 ft. From the great height at which the former appeared, from the question-mark given its identification at the time, and, lastly, from the same doubt expressing itself when it was encountered on the descent upon the other face of the mountain, it is probable that the supposed Silver Fir was a Cork Fir and it will so be provisionally considered. The Cork Fir is a tree of high habitat, intermediate between the Fir and Spruce zones, though belonging properly to the former. It was found in this investigation only on the Peaks, but there both on the southwest and north outer slopes as well as everywhere at the proper elevation inside the crater. Its range on the outer southwest slope was from 9,350 ft. to about 10,700 ft.

It was hot here and the forest dense, so that one was shut in with the trees in spite of the slope. In the thickest part stood the lowest Engelmann Spruce at 10,230 ft. From this on it grew commoner, but was not joined by the Fox-Tail pine till just before the Cork Fir gave over, at 10,680 ft.

From 10,500 ft. to 11,500 ft. lay the Spruce zone proper, the open character of its trees on this particular slope and the vistas off giving one the impression of being on a mansard roof. The Spruce and the Fox-Tail pine shared the slope exclusively, the red next year's buds of the latter giving it a fictitious bloom. At 11,500 ft. the ridge came to an end and both trees became dwarfed, forming the Timber-line zone which straggled up to 12,080 ft. and there gave place to bare rock. The peak of Agassiz now came into view for the first time since leaving camp and clouds close at hand could be seen to form and scurry over the summit from the east. Its rocky mass, patched with snow, stared the travellers in the face with a towering sense of desolation, the sky line above being formed of two steep ridges of ascending arête at right angles culminating in the peak, now visible, now not. Striking for the arête on the left the travellers eventually came out upon it at the point where the snow began. Here the view ahead opened before the climbers, to the dismay of the journalist upon whom the route yet to be traversed dawned for the first time in dispiriting apparition and who in consequence decided to forego Agassiz as he was very tired, preferring to circuit the peak to a lunch rendezvous on its northern face while the two others climbed the rocky talus to its top (12,340 ft.). Intermittent drifting clouds over the summit gave just a chance to heliograph the Observatory far below, eight miles away in an airline. From this vantage-point the eye got a superb view of the crater within and the walls enclosing it, especially the series of escarpments stretching north to Humphrey. The scene was desolate, enhancedly so from the grey fleeces of cloud that seemed to chase one another from the abyss out over the top and down the outer

INSIDE THE SAN FRANCISCO CRATER.

slopes. Height flattened the lower reaches of the mountain till one had said the greater part of its mass was bare rock. It certainly seemed an inconceivable distance down to the spires of the topmost firs.

It was now 1 o'clock and the partial view of the long distance yet to be gone with an uncertain goal at the end tended to emphasize the inhospitableness of the surroundings. Nevertheless, the lunch amid the snow just under the lea of the crater-rim had a setting and a taste the best of cooks had envied. Then up and down along the rim the explorers proceeded, finding pretty little flowers in the crannies of the rocks and at a low part of the jaws at 12,050 ft. some dwarf Engelmann Spruce at the very crater's edge. Farther on a Fox-Tail pine, whose trunk measured 15 inches diameter, crouched at 12,020 ft. to get out of the wind. Upon this west slope the highest Fox-Tail pine stood at 12,080 ft., the timber-line, sparse as it was in occupants, reaching to about the same height on this whole side of the mountain. The view off was superb. The near foreground stood desolate to a degree, rocky ribs protruding amid heaps of broken slabs, but below that the evergreens, spruce, pine and fir laid a carpet of vert, splashed here and there with gorgeous gleams of gold and orange made by colonies of the quaking asp.

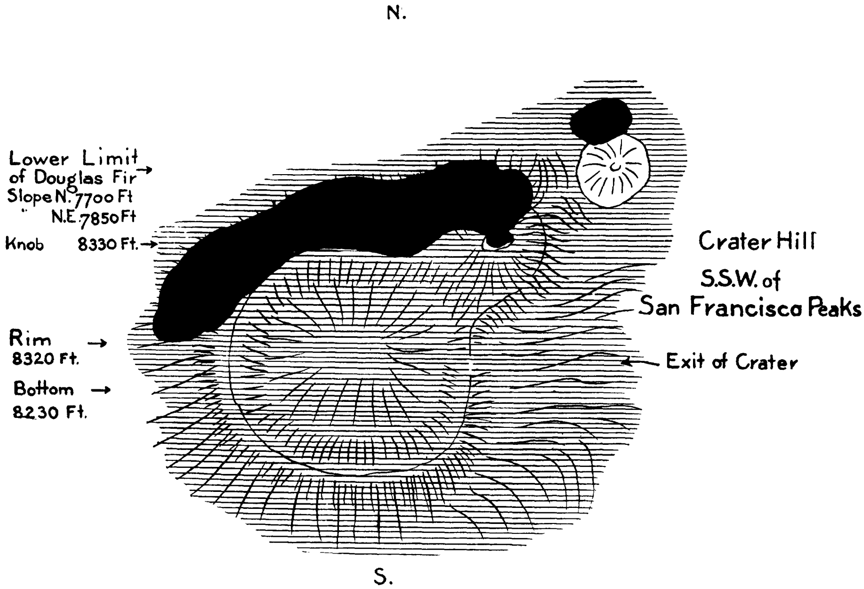
Deeming it easier, the journalist, taking the man-servant with him, skirted the summits some hundred of feet down, while the writer pushed upward to the top of Humphrey (12,610 ft.). Here the snow stretched continuous and upon it at the very apex of the peak showed the recent tracks of a chipmunk, going to the cairn which crowned it. It was probably a *Tamias Cinoreicollis* which according to Merriam is most common where the Pine and the Fir zones overlap, but climbs as high as the timber line. Quite a journey thence to the summit and amid the snow to boot! What an immense height it must have seemed through the lenses of its little eyes unless its brain mechanism be very different from man's. A couple of eagles soaring rythmically round, a stone's throw below the peak, was the only present evidence of life.

A snow-wrapped arête twenty feet wide led down nearly north, the snow making excellent glissades, sixty feet at a stride; a luxury of progression, especially after the long toil up. From above, it looked to be half-way to the foot before the snow came to an end, but the shoulders below rose as one descended, the bottom still lying a far distance off. On the ridge the timber line was reached at 11,960 ft. Upon the northwest side of the ridge opposite, to the east, the trees seemed to start a little lower and we may therefore take the coldest timber-line at 11,850 ft. The Fox-Tail pine on the north slope out-climbed the White Spruce by some fifty feet. As a tree, the Spruce first stood up at 11,480 ft., and the Fox-Tail pine stood up with it. The red buds of the coming year on this tree were, next to its fox tails, its most striking feature. It is well named, and so like are its twigs to a fox's brush as to make up in part for the lack of animal life. For no creature, except the eagles, was visible from start to finish.

At 10,840 ft. the Cork Fir appeared again to continue down to 9,510 ft., while the Silver Fir appeared once in the note-book with a question mark at the latter elevation. On this side of the mountain the Rocky Mountain pine was first met with on the descent at 10,760 ft. and the Douglas Fir at 10,160. Meanwhile nothing could be descried of the sheep-camp nor even of its probable location, several natural clearings answering equally well the description given of it, and affording no further sign of domestication as descent brought them nearer. The explorers were beginning to stare a homeless night in the face when a cry from the journalist announced a find as he pointed to a faint curl of blue smoke in the great forest below. The explorers made no doubt that this was their goal because of some things that looked like tents near it and headed down in its direction. The trees then shut out the view, so timbered were the slopes, and they had to steer for it by occasional glimpses of the distant cones below to the north.

Meanwhile, the first yellow pine had been met at 9,000 ft. and soon the yellow pines began to increase and the Douglas Firs and Rocky Mountain pines to thin until, at 8,780 ft., the last of the latter bade goodbye just as the party debouched from the ridges out upon the gentler slope of the plateau. It now started to drizzle and darkness came on apace. A cart-track, it was known, ran round the mountain to the sheep-camp, to strike which was now their endeavour. It shortly grew so dark that unless they met it soon there was small chance of their recognizing it when they did cross it. A few more minutes would settle any possibility when, by good luck, they struck it. Turning along it to the right, they tramped steadily on in the rain for what seemed an excessive distance, when one of the party caught sight of a will-o-the-wisp light through the timber which eventually proved to be the camp-fire. They arrived to find it, as well as the sheep-camp, deserted. Nothing was to be seen of Doyle, though the wagons were there, the horses tethered and the tents pitched. Presently a distant shot, and then another, told of Doyle's distress. He was out hunting them. But they had no gun and their answering shouts failed of response. To hunt Doyle in their own tired and soggy state seemed supererogation. There was nothing for it but to make themselves at home until such time as he should come in, disheartened; which eventually he did, to be astonished but consoled.

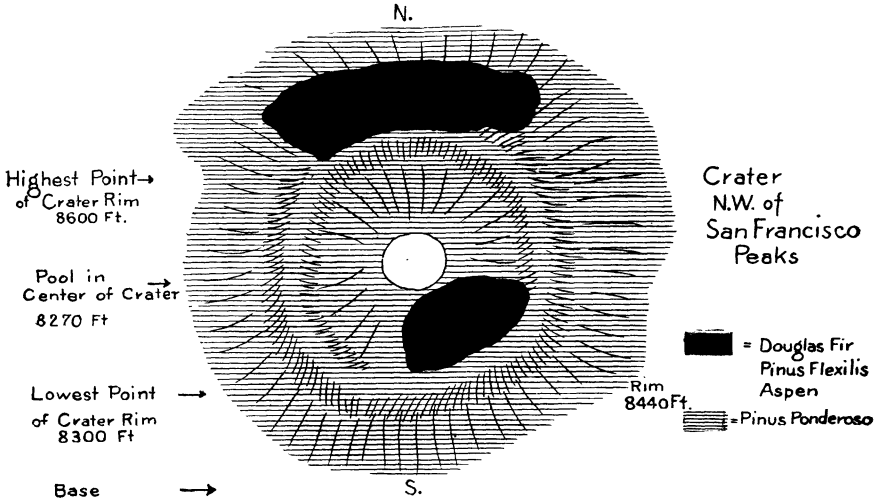
The following morning the journalist and the director started from the sheep-camp at 8,460 ft. and drove westward round the mountain to Little Spring and thence northwest to Walker Lake. The cone of this old crater is peculiar for its very symmetry; looking, as seen from above on the Peaks, like a race-track. Its base stands at 8,220 ft. and a short rise of 100 feet in height brings one to the rim of its bowl, which, at the bottom, holds an ill-appearing marsh. It is clothed without and within by trees, but the interesting peculiarity about it is their zonal distribution. One had said the sun from the southeast had cast a shadow of firs into the crater and down the opposite outer slopes, so regularly placed are the Douglas Spruce and the Rocky Mountain pine amid the encompassing *Pinus Ponderosa.* The rim by an easy grade rises to 8,600 ft. N.N.W. and then falls to an outlet S.W. Here one may see, at a glance, the result of slope exposure and determine it almost to the nicety of a degree. The axis of greatest cold in its effect on tree-life lay



north-north-west. This accorded with the showing of Wing Mt. and Crater Hill. The side of coldest exposure was thus not opposite to the slope of greatest heat, the latter lying southwest.

VI.

Several things these various trips brought out clearly as to the habitat of trees. They showed in the first place that thinness of air offered no obstacle to the trees' growth. Provided thermometric conditions of climate were right, barometric differences had no perceptible effect. Altitude took the place of latitude in the distribution of the several genera and species; the trees behaving in range as height above the sea instead of distance from the equator marked out for them so many different worlds, each peopled by its own denizens not at home in any other. It did this in a manner the more recognizable, by substituting for the scale on which it was performed feet in place of miles. On the level it takes such a distance to alter climatic conditions that the inevitable fringe of divided domain, where two species overlap, masks the full strikingness of their real differentiation. But on a mountain islet of vegetation a thousand feet will do the business, and the various kinds of trees succeed one another with startling abruptness. On the San Francisco Peaks this is peculiarly evident, the species segregating into definite communities, banding the peaks in distinct zones. And on


N.
Highest Point→ of Crater Rim 8600 Ft.
Pool in Center of Crater → 8270 Ft
Lowest Point → of Crater Rim 8300 Ft
Base → 8220 Ft.
S.
Rim 8440 Ft.
Crater N.W. of San Francisco Peaks
= Douglas Fir Pinus Flexilis Aspen
= Pinus Ponderoso

Showing Axis of Cold Exposure.

the mountain mass itself this is not a question of moisture, since all parts of it receive about the same rainfall.

Slope exposure in its effect on habitat was another point equally well defined in consequence of the circularity of the island communities. The distribution of the several trees became in some sort a matter of the conic sections, in which by passing a plane through the crater cone at the proper angle one could predict the habitat of a given spruce or pine; not quite as simply, however, as Dr. Merriam supposed, there being in fact two axes, one of cold N.N.W. and one of warmth S.W. Dr. Merriam's work, however, can hardly be too highly praised. For it is one of the best scientific productions of recent years.

It becomes an interesting problem to discover to what this orientation of cold was due. Unlike animals that can hibernate in winter, it seems that with plants, not the maximum temperature, but rather the minimum, determines their habitat. And it is evident from the way in which, as a rule, they wrap up their buds that the keeping out of the cold is with them an important object. Winds, therefore, must play a part in their life functioning; in other words, they are not the cold-blooded things we are apt to imagine them. But as they are fixed to the spot, they must take what comes. This may be too much heat, but, more vitally, is too much cold. It is thus not simply the amount of sun they receive, but the character of the winds which determines whether they shall thrive or perish. Slope exposure, pure and simple, has thus to be compounded with the direction of the coldest winds. As these at the latitude of the Peaks are the northwest winds, the axis of cold is shifted in that direction. In a similar manner, the winds to the west of south are more genial than those to the east of it, so that the southwestern becomes the warm slope.

But a third factor enters into the problem of tree habitat, the one to which the present research was specifically directed—the mass of land at a given height. Upon this point the evidence got by the investigation was no less conclusive. It is evident in the figures given for the heights at which different species were found upon the Peaks and elsewhere, but it becomes more easily evident to the eye when the profile of the Peaks is given in elevation banded by the several tree zones, as is done in the accompanying charts. The plateau effect then becomes visible at a glance.

On looking at the diagrammatic picture of the San Francisco Peaks, chart No. 1, one sees first the fundamental zonal distribution; secondly, the effect of slope exposure; in the Fir zone that tips the

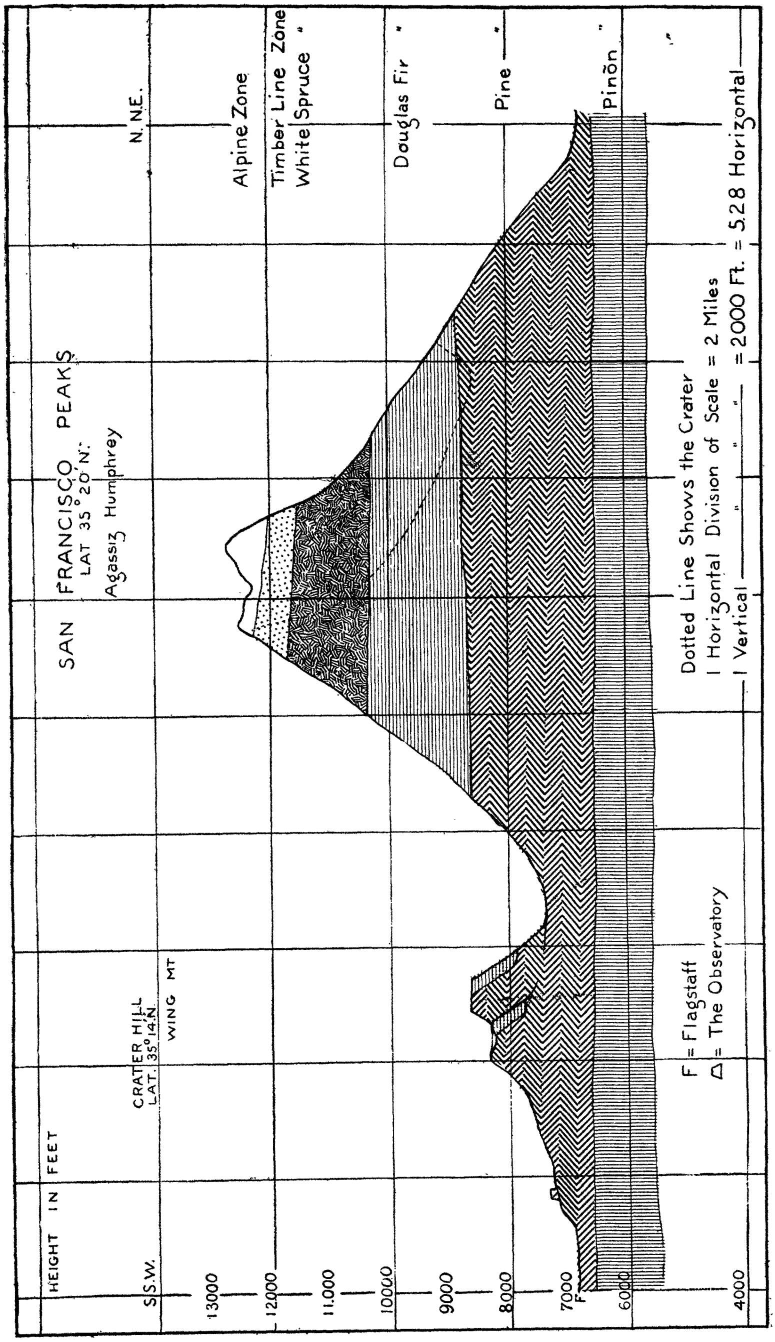

HEIGHT IN FEET
S.S.W.
N.N.E.
13000
12000
11.000
10000
9000
8000
7000
F
6000
4000
SAN FRANCISCO PEAKS
LAT 35° 20' N.
Agassiz Humphrey
CRATER HILL
LAT. 35° 14 N.
WING MT
Alpine Zone
Timber Line Zone
White Spruce "
Douglas Fir "
Pine "
Piñon "
Dotted Line Shows the Crater
1 Horizontal Division of Scale = 2 Miles
1 Vertical " " " = 2000 Ft. = 5.28 Horizontal
F = Flagstaff
Δ = The Observatory

CHART No. 1.

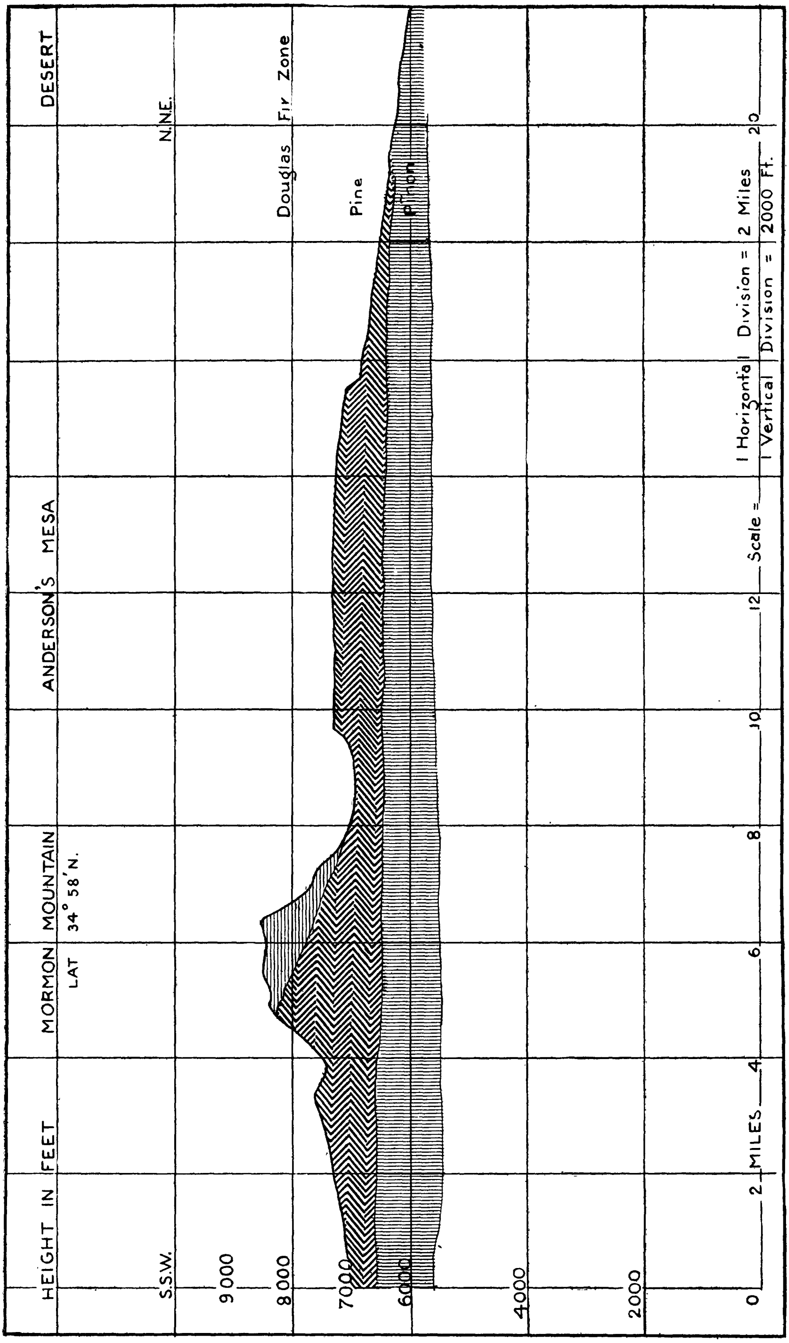

HEIGHT IN FEET
MORMON MOUNTAIN
LAT 34° 58′ N.
ANDERSON'S MESA
DESERT
S.S.W.
N.N.E.
9000
8000
7000
6000
4000
2000
0
Douglas Fir Zone
Pine
Piñon
MILES
2
4
6
8
10
12
20
Scale = 1 Horizontal Division = 2 Miles
1 Vertical Division = 2000 Ft.

CHART No. 2.

northern flanks of Crater Hill and Mormon Mt. and in the north-downward tilt of the upper zones, the Alpine, the Timber-line and the White Spruce zones of the Peaks. But with attention one is struck by something else, something which indeed is evident even in Merriam's diagrams, though not pointed out, but much more so here. The zones tilt less the greater the land-mass under them. Thus, not only do the lower zones, which rest on more land than those higher up, tip down less to the north, but the lowest actually rise on the north against the effect of slope exposure, the plateau generation of warmth more than counterbalancing the opposite influence due the aspect. A more striking demonstration of the potency of a plateau could hardly have been devised.

The like action may be followed in its smaller ramifications. Thus the fir zone falls much lower on Crater Hill and Wing Mt. than where it bands the Peaks. The same effect is visible in the alignment of the zones on Mormon Mt., chart No. 2, as compared with those upon the greater mountain mass of the Peaks. The fir zone was lower on Mormon Mt., both north and south, than it was on the Peaks; and one may notice as between it and Crater Hill the effect of the presence or absence of the mass of the Peaks themselves. The influence of a raising of the whole height of land is thus brought out, not in one, but in every instance where it was tested and not less interesting than the character of the country is the prettiness of the proof.

Nor is the reason for it unrecognizable; though it might not have been argued *a priori*. It consists evidently in the heating of the ground. It is at once clear that a small body of land warmed to a certain temperature must cool off quicker than a large one. Especially is this the case if the small one be in the form of a pinnacle, since it exposes itself to cooling on the sides as well as on top. A plateau, therefore, should, other things being the same, have a higher temperature than a peak. This should be reflected in the behaviour of its tree life. What is, perhaps, surprising is the greater effect relatively of the sun on the ground as compared with the air than what one would have supposed. But Very's latest investigation on the day temperature of the Moon—which reaches 370° F.—quite falls in line with it.

The subject of a plateau's climatic effect on temperature and thence on animal and vegetable life as compared with a peak's is one not confined to the earth; for in its general bearing it is planetary.